



# Questions & Answers

*about . . .*

## Acne

*National Institute of Arthritis and Musculoskeletal and Skin Diseases (NIAMS)  
National Institutes of Health  
Public Health Service • U.S. Department of Health and Human Services*

## For Your Information

This publication contains information about medications used to treat the health condition discussed in this booklet. When this booklet was printed, we included the most up-to-date (accurate) information available. Occasionally, new information on medication is released.

For updates and for any questions about any medications you are taking, please contact the U.S. Food and Drug Administration at 1-888-INFO-FDA (1-888-463-6332, a toll-free call) or visit their Web site at [www.fda.gov](http://www.fda.gov).

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National Institute of Arthritis and Musculoskeletal  
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You can also find this booklet on the NIAMS Web site at [www.niams.nih.gov/hi/topics/acne/acne.htm](http://www.niams.nih.gov/hi/topics/acne/acne.htm).

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This booklet contains general information about acne. It describes what acne is and how it develops, the causes of acne, and the treatment options for various forms of acne. Information is also provided on caring for the skin. If you have further questions after reading this booklet, you may wish to discuss them with your doctor.

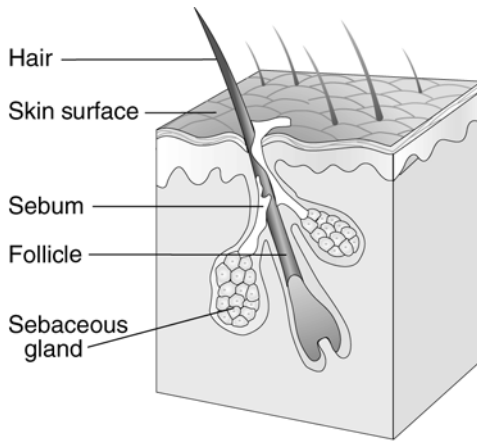
## What Is Acne?

Acne is a disorder resulting from the action of hormones on the skin's oil glands (sebaceous glands), which leads to plugged pores and outbreaks of lesions commonly called pimples or zits. Acne lesions usually occur on the face, neck, back, chest, and shoulders. Nearly 17 million people in the United States have acne, making it the most common skin disease. Although acne is not a serious health threat, severe acne can lead to disfiguring, permanent scarring, which can be upsetting to people who are affected by the disorder.

## How Does Acne Develop?

Doctors describe acne as a disease of the pilosebaceous units (PSUs). Found over most of the body, PSUs consist of a sebaceous gland connected to a canal, called a follicle, that contains a fine hair (see "Normal Pilosebaceous Unit" diagram, page 2). These units are most numerous on the face, upper back, and chest. The sebaceous glands make an oily

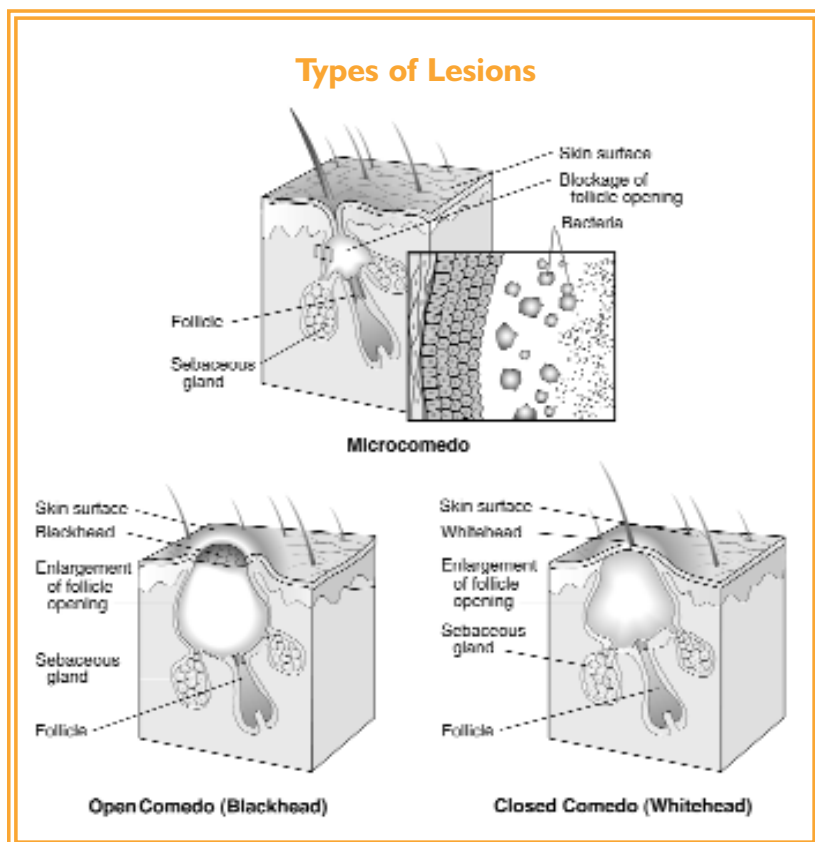
### Normal Pilosebaceous Unit



substance called sebum that normally empties onto the skin surface through the opening of the follicle, commonly called a pore. Cells called keratinocytes line the follicle.

The hair, sebum, and keratinocytes that fill the narrow follicle may produce a plug, which is an early sign of acne. The plug prevents sebum from reaching the surface of the skin through a pore. The mixture of oil and cells allows bacteria *Propionibacterium acnes* (*P. acnes*) that normally live on the skin to grow in the plugged follicles. These bacteria produce chemicals and enzymes and attract white blood cells that cause inflammation. (Inflammation is a characteristic reaction of tissues to disease or injury and is marked by four signs: swelling, redness, heat, and pain.) When the wall of the plugged follicle breaks down, it spills everything into the nearby skin—sebum, shed skin cells, and bacteria—leading to lesions or pimples.

People with acne frequently have a variety of lesions, some of which are shown in the diagrams below. The basic acne lesion, called the comedo (KOM-e-do), is simply an enlarged and plugged hair follicle. If the plugged follicle, or comedo, stays beneath the skin, it is called a closed comedo and produces a white bump called a whitehead. A comedo that reaches the surface of the skin and opens up is called a blackhead because it looks black on the skin's surface. This black discoloration is not due to dirt. Both whiteheads and blackheads may stay in the skin for a long time.



Other troublesome acne lesions can develop, including the following:

- **Papules**—inflamed lesions that usually appear as small, pink bumps on the skin and can be tender to the touch
- **Pustules (pimples)**—papules topped by pus-filled lesions that may be red at the base
- **Nodules**—large, painful, solid lesions that are lodged deep within the skin
- **Cysts**—deep, painful, pus-filled lesions that can cause scarring.

## What Causes Acne?

The exact cause of acne is unknown, but doctors believe it results from several related factors. One important factor is an increase in hormones called androgens (male sex hormones). These increase in both boys and girls during puberty and cause the sebaceous glands to enlarge and make more sebum. Hormonal changes related to pregnancy or starting or stopping birth control pills can also cause acne.

Another factor is heredity or genetics. Researchers believe that the tendency to develop acne can be inherited from parents. For example, studies have shown that many school-age boys with acne have a family history of the disorder.



Certain drugs, including androgens and lithium, are known to cause acne. Greasy cosmetics may alter the cells of the follicles and make them stick together, producing a plug.

### *Factors That Can Make Acne Worse*

Factors that can cause an acne flare include:

- Changing hormone levels in adolescent girls and adult women 2 to 7 days before their menstrual period starts
- Friction caused by leaning on or rubbing the skin
- Pressure from bike helmets, backpacks, or tight collars
- Environmental irritants, such as pollution and high humidity
- Squeezing or picking at blemishes
- Hard scrubbing of the skin.

### *Myths About the Causes of Acne*

There are many myths about what causes acne. Chocolate and greasy foods are often blamed, but foods seem to have little effect on the development and course of acne in most people. Another common myth is that dirty skin causes acne; however, blackheads and other acne lesions are not caused by dirt. Finally, stress does not cause acne.

## Who Gets Acne?

People of all races and ages get acne. It is most common in adolescents and young adults. Nearly 85 percent of people between the ages of 12 and 24 develop the disorder. For most people, acne tends to go away by the time they reach their thirties; however, some people in their forties and fifties continue to have this skin problem.

## How Is Acne Treated?

Acne is often treated by dermatologists (doctors who specialize in skin problems). These doctors treat all kinds of acne, particularly severe cases. Doctors who are general or family practitioners, pediatricians, or internists may treat patients with milder cases of acne.

The goals of treatment are to heal existing lesions, stop new lesions from forming, prevent scarring, and minimize the psychological stress and embarrassment caused by this disease. Drug treatment is aimed at reducing several problems that play a part in causing acne: abnormal clumping of cells in the follicles, increased oil production, bacteria, and inflammation. Depending on the extent of the person's acne, the doctor will recommend one of several over-the-counter (OTC) medicines or prescription medicines that are topical (applied to the skin) or systemic (taken by mouth). The doctor may suggest using more than one topical medicine or combining oral and topical medicines.

## Treatment for Blackheads, Whiteheads, and Mild Inflammatory Acne

Doctors usually recommend an OTC or prescription topical medication for people with mild signs of acne. Topical medicine is applied directly to the acne lesions or to the entire area of affected skin.

Benzoyl peroxide, resorcinol, salicylic acid, and sulfur are the most common topical OTC medicines used to treat acne. Each works a little differently. Benzoyl peroxide is best at killing *P. acnes* and may reduce oil production. Resorcinol, salicylic acid, and sulfur help break down blackheads and whiteheads. Salicylic acid also helps cut down the shedding of cells lining the follicles of the oil glands. Topical OTC medications are available in many forms, such as gel, lotion, cream, soap, or pad.

In some patients, OTC acne medicines may cause side effects such as skin irritation, burning, or redness. Some people find that the side effects lessen or go away with continued use of the medicine. Severe or prolonged side effects should be reported to the doctor.

OTC topical medicines are somewhat effective in treating acne when used regularly. Patients must keep in mind that it can take 8 weeks or more before they notice their skin looks and feels better.

## Treatment for Moderate to Severe Inflammatory Acne

Patients with moderate to severe inflammatory acne may be treated with prescription topical or oral medicines, alone or in combination.

### *Prescription Topical Medicines*

Several types of prescription topical medicines are used to treat acne, including antibiotics, benzoyl peroxide, tretinoin, adapalene, and azelaic acid. Antibiotics and azelaic acid help stop or slow the growth of bacteria and reduce inflammation. Tretinoin, a type of drug called a retinoid that contains an altered form of vitamin A, is an effective topical medicine for stopping the development of new comedones. It works by unplugging existing comedones, thereby allowing other topical medicines, such as antibiotics, to enter the follicles. The doctor may also prescribe newer retinoids or retinoid-like drugs, such as tazarotene or adapalene, that help decrease comedo formation.

Like OTC topical medicines, prescription topical medicines come as creams, lotions, solutions, or gels. The doctor will consider the patient's skin type when prescribing a product. Creams and lotions provide moisture and tend to be good for people with sensitive skin. Gels and solutions are generally alcohol based and tend to dry the skin. Therefore, patients with very oily skin or those who live in hot, humid

climates may prefer them. The doctor will tell the patient how to apply the medicine and how often to use it.

Some people develop side effects from using prescription topical medicines. Initially, the skin may look worse before improving. Common side effects include stinging, burning, redness, peeling, scaling, or discoloration of the skin. With some medicines, like retinoids, these side effects usually decrease or go away after the medicine is used for a period of time. Patients should report prolonged or severe side effects to their doctor. Between 4 and 8 weeks will most likely pass before patients see their skin improve.

### *Prescription Oral Medicines*

For patients with moderate to severe acne, the doctor often prescribes oral antibiotics (taken by mouth). Oral antibiotics are thought to help control acne by curbing the growth of bacteria and reducing inflammation. Prescription oral and topical medicines may be combined. For example, benzoyl peroxide may be combined with clindamycin, erythromycin, or sulfur. Other common antibiotics used to treat acne are tetracycline, minocycline, and doxycycline. Some people have side effects when taking these antibiotics, such as an increased tendency to sunburn, upset stomach, dizziness or lightheadedness, and changes in skin color. Tetracycline is not given to pregnant women, nor is it given to children under 8 years of age because it might discolor developing teeth. Tetracycline and minocycline may also decrease the effectiveness of birth control pills. Therefore, a backup or

another form of birth control may be needed. Prolonged treatment with oral antibiotics may be necessary to achieve the desired results.

## **Treatment for Severe Nodular or Cystic Acne**

People with nodules or cysts should be treated by a dermatologist. For patients with severe inflammatory acne that does not improve with medicines such as those described above, a doctor may prescribe isotretinoin (Accutane\*), a retinoid. Isotretinoin is an oral drug that is usually taken once or twice a day with food for 15 to 20 weeks. It markedly reduces the size of the oil glands so that much less oil is produced. As a result, the growth of bacteria is decreased.

### *Advantages of Isotretinoin (Accutane)*

Isotretinoin is a very effective medicine that can help prevent scarring. After 15 to 20 weeks of treatment with isotretinoin, acne completely or almost completely goes away in up to 90 percent of patients. In those patients where acne recurs after a course of isotretinoin, the doctor may institute another course of the same treatment or prescribe other medicines.

\* Brand names included in this booklet are provided as examples only, and their inclusion does not mean that these products are endorsed by the National Institutes of Health or any other Government agency. Also, if a particular brand name is not mentioned, this does not mean or imply that the product is unsatisfactory.

### *Disadvantages of Isotretinoin (Accutane)*

Isotretinoin can cause birth defects in the developing fetus of a pregnant woman. **It is important that women of child-bearing age are not pregnant and do not get pregnant while taking this medicine.** Women must use two separate effective forms of birth control at the same time for 1 month before treatment begins, during the entire course of treatment, and for 1 full month after stopping the drug. They should ask their doctor when it is safe to get pregnant after they have stopped taking Accutane.

Some people with acne become depressed by the changes in the appearance of their skin. Changes in mental health may be intensified during treatment or soon after completing a course of medicines like Accutane. A doctor should be consulted if a person feels unusually sad or has other symptoms of depression, such as loss of appetite or trouble concentrating.

Other possible side effects include dry eyes, mouth, lips, nose, or skin; itching; nosebleeds; muscle aches; sensitivity to the sun; and, sometimes, poor night vision. More serious side effects include changes in the blood, such as an increase in triglycerides and cholesterol, or a change in liver function. To make sure Accutane is stopped if side effects occur, the doctor monitors blood studies that are done before treatment is started and periodically during treatment. Side effects usually go away after the medicine is stopped.

## Treatments for Hormonally Influenced Acne in Women

Clues that help the doctor determine whether acne in an adult woman is due to an excess of androgen hormones are hirsutism (excessive growth of hair in unusual places), premenstrual acne flares, irregular menstrual cycles, and elevated blood levels of certain androgens. The doctor may prescribe one of several drugs to treat women with this type of acne. Low-dose estrogen birth control pills help suppress the androgen produced by the ovaries. Low-dose corticosteroid drugs, such as prednisone or dexamethasone, may suppress the androgen produced by the adrenal glands. Finally, the doctor may prescribe an antiandrogen drug, such as spironolactone (Aldactone). This medicine reduces excessive oil production. Side effects of antiandrogen drugs may include irregular menstruation, tender breasts, headache, and fatigue.

## Other Treatments for Acne

Doctors may use other types of procedures in addition to drug therapy to treat patients with acne. For example, the doctor may remove the patient's comedones during office visits. Sometimes the doctor will inject cortisone directly into lesions to help reduce the size and pain of inflamed cysts and nodules.



Early treatment is the best way to prevent acne scars. Once scarring has occurred, the doctor may suggest a medical or surgical procedure to help reduce the scars. A superficial laser may be used to treat irregular scars. Another kind of laser allows energy to go deeper into the skin and tighten the underlying tissue and plump out depressed scars. Dermabrasion (or microdermabrasion), which is a form of “sanding down” scars, is sometimes combined with the subsurface laser treatment. Another treatment option for deep scars caused by cystic acne is the transfer of fat from one part of the body to the face.

## How Should People With Acne Care for Their Skin?

### *Clean Skin Gently*

Most doctors recommend that people with acne gently wash their skin with a mild cleanser, once in the morning and once in the evening and after heavy exercise. Some people with acne may try to stop outbreaks and oil production by scrubbing their skin and using strong detergent soaps and rough scrub pads. However, scrubbing will not improve acne; in fact, it can make the problem worse. Patients should ask their doctor or another health professional for advice on the best type of cleanser to use. Patients should wash their face from under the jaw to the hairline. It is important that patients thoroughly rinse their skin after washing it. Astringents are not recommended unless the skin is very oily, and then they should be used only on oily

spots. Doctors also recommend that patients regularly shampoo their hair. Those with oily hair may want to shampoo it every day.

### *Avoid Frequent Handling of the Skin*

People who squeeze, pinch, or pick their blemishes risk developing scars or dark blotches. People should avoid rubbing and touching their skin lesions.

### *Shave Carefully*

Men who shave and who have acne can test both electric and safety razors to see which is more comfortable. Men who use a safety razor should use a sharp blade and soften their beard thoroughly with soap and water before applying shaving cream. Nicking blemishes can be avoided by shaving lightly and only when necessary.

### *Avoid a Sunburn or Suntan*

Many of the medicines used to treat acne can make a person more prone to sunburn. A sunburn that reddens the skin or suntan that darkens the skin may make blemishes less visible and make the skin feel drier. However, these benefits are only temporary, and there are known risks of excessive sun exposure, such as more rapid skin aging and a risk of developing skin cancer.

### *Choose Cosmetics Carefully*

People being treated for acne often need to change some of the cosmetics they use. All cosmetics, such as foundation, blush, eye shadow, and moisturizers, should be oil free. Patients may find it difficult to apply foundation evenly during the first few weeks of treatment because the skin may be red or scaly, particularly with the use of topical tretinoin or benzoyl peroxide. Oily hair products may eventually spread over the forehead, causing closed comedones. Products that are labeled as noncomedogenic (do not promote the formation of closed pores) should be used; in some people, however, even these products may cause acne.

### **What Research Is Being Done on Acne?**

Medical researchers are working on new drugs to treat acne, particularly topical antibiotics to replace some of those in current use. As with many other types of bacterial infections, doctors are finding that, over time, the bacteria that are associated with acne are becoming resistant to treatment with certain antibiotics. Research is also being conducted by industry on the potential side effects of isotretinoin and the long-term use of medicines used for treating acne.

Scientists are working on other means of treating acne. For example, researchers are studying the biology of sebaceous cells and testing a laser in laboratory animals to treat acne by

disrupting sebaceous glands. Scientists are also studying the treatment of androgenic disorders, including acne, in men by inhibiting an enzyme that changes testosterone to a more potent androgen.

## Where Can People Find More Information on Acne?

- **National Institute of Arthritis and Musculoskeletal and Skin Diseases (NIAMS)**

National Institutes of Health

1 AMS Circle

Bethesda, MD 20892-3675

Phone: 301-495-4484 or

877-22-NIAMS (226-4267) (free of charge)

TTY: 301-565-2966

Fax: 301-718-6366

[www.niams.nih.gov](http://www.niams.nih.gov)

NIAMS provides information about various forms of arthritis and rheumatic disease and bone, muscle, joint, and skin diseases. It distributes patient and professional education materials and refers people to other sources of information. Additional information and updates can also be found on the NIAMS Web site.

- **American Academy of Dermatology**

P.O. Box 4014

Schaumburg, IL 60168-4014

Phone: 847-330-0230 or

888-462-3376 (free of charge)

Fax: 847-330-0050

[www.aad.org](http://www.aad.org)

This national organization can provide referrals to dermatologists. It also publishes a brochure on acne for adults and a fact sheet for young people. These are available on the organization's Web site or can be obtained by calling or writing to the academy.

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The mission of the National Institute of Arthritis and Musculoskeletal and Skin Diseases (NIAMS), a part of the Department of Health and Human Services' National Institutes of Health (NIH), is to support research into the causes, treatment, and prevention of arthritis and musculoskeletal and skin diseases, the training of basic and clinical scientists to carry out this research, and the dissemination of information on research progress in these diseases. The National Institute of Arthritis and Musculoskeletal and Skin Diseases Information Clearinghouse is a public service sponsored by the NIAMS that provides health information and information sources. Additional information can be found on the NIAMS Web site at [www.niams.nih.gov](http://www.niams.nih.gov).



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